

THE AMERICAN JOURNAL OF OPHTHALMOLOGY

VOL. XXVIII.

DECEMBER, 1911.

No. 12

ORIGINAL ARTICLES.

PREVENTION OF OPHTHALMIA NEONATORUM.*

By M. H. Post, M.D.,
ST. LOUIS, MO.

Mr. Chairman and Members of the Obstetric Section:

I feel greatly complimented that you should listen to a paper by me on the subject of the Prevention of Ophthalmia Neonatorum.

It seems to be generally accepted that upon the oculist rests the burden of preventing blindness of all kinds, including that from ophthalmia neonatorum. This is a mistake. He is often called upon to cure it, and to prevent the disasters which it brings; but for its prevention we must look to the obstetrician.

"An ounce of prevention is worth a pound of cure", and while the oculist may have the pound of cure, if the obstetrician will use his ounce of prevention, it will be better for the baby and will save the oculist considerable anxiety.

By ophthalmia neonatorum is meant a severe conjunctivitis developing in the eyes of a child within five or six days after birth. It was formerly regarded as the gonorrhœal ophthalmia of infancy. Unfortunately this is true in about 63 per cent. of the cases; but in the remaining 37 per cent. it is not due to infection by the gonococcus, but by some other germ, as the pneumococcus, staphylococcus, diplobacillus, etc.

The most dangerous cases are due to the gonococcus; those from other bacteria are much less so.

*Read by request before the Obstetric Section of the St. Louis Medical Society, November 28, 1911.

If we can prevent the entrance of these germs into the conjunctival sac we shall have perfectly accomplished the much-desired "prevention". The germ of the disease is derived from the secretions of the vaginal canal of the mother. If this is aseptic there is no danger of ophthalmia neonatorum.

I would suggest that the vaginal secretions of the mother be most carefully examined for the gonococcus, pneumococcus, streptococcus, etc., shortly prior to her entering upon labor. If the gonococcus, pneumococcus, streptococcus, or any pathogenic germs were found, means could at once be adopted to get rid of them. The measure which naturally suggests itself to me is the use of any antiseptic vaginal douche. This suggestion comes to my mind from my experience and observation as an interne at the St. Louis Female Hospital, before we knew anything about bacteria and their relation to disease. We only knew of the dangers of gonorrhœal pus.

Dr. Peter V. Schenck was superintendent at that time, and every woman in the first stage of labor was given an antiseptic douche containing carbolic acid and glycerine. While I was in the hospital there were probably one hundred and fifty confinements. There was no case of ophthalmia neonatorum. I have attributed this to the use of the antiseptic douche.

I believe that the obstetricians to-day do not employ these douches on the ground that they may be injurious to the mother, forcing poisonous secretions further up into the genital tract and thus infecting her. I do not know how this may be and leave it for you to decide. If it is safe, I am very much in favor of the antiseptic vaginal douche in the first stage of labor, as an important measure in the prevention of ophthalmia neonatorum, especially in suspicious or even doubtful cases. Where this has been depended upon alone, it has produced no such results as the Credé method.

If we consider the mechanical conditions affecting the eyes of the infant in a normal labor as the head passes through the vaginal canal in a vertex presentation, we will realize that the conjunctival sacs of the child are tightly closed by the pressure of the vaginal walls against the eyelids, and it is almost impossible for the gonococcus to gain entrance into the conjunctival sac before the face is extruded, and the infection of the eyes is hardly possible before the face has been delivered. If poisonous germs are in the vaginal secretion which cover the child's face immediately after birth, the germs may be winked into the

eyes by the child opening and shutting its lids, or possibly the baby may rub its eyes with its fists and thus push the germs into the conjunctival sacs.

But I believe the most common cause is careless methods of handling the baby and washing its face. I believe that the disease-causing germ may be wiped into the eye by the nurse unless she is very careful in washing and wiping the baby's face and hands.

At first it is a case for mechanical cleanliness. I believe it is a good plan to wrap the baby in a towel confining the hands and exposing the face as soon as it is born. Then with small pledgets of absorbent cotton and microscopic care, to wipe all secretion from the lids, especially from their edges. If this is done promptly after the birth of the child, even if the gonococcus is present, it will lessen the chances of infecting the mucous membrane of the sac. Removal by any means such as flushing the sac with normal saline solution, or with a 2 per cent. boracic acid solution, would help to prevent the disease. Such measures have been practiced, but the results have not been as good as where antiseptic solutions have been dropped into the eyes.

To Credé belongs the chief credit for teaching how ophthalmia neonatorum may be prevented. His idea was to put into the conjunctival sac of the infant, as soon after birth as possible, a germicide that would destroy the pathogenic bacteria. Dr. Swan M. Burnett describes Credé's method in "A System of Diseases of the Eye, by Norris and Oliver:" "As soon as the head has passed the vulva, the face of the child is wiped clean, the eyelids are opened with the fingers and a drop of a two per cent. solution of nitrate of silver is let fall from a glass rod on the eyeball."

I have never practiced the Credé method and so must judge of it by what I have read and by the results I have seen. Its introduction into the lying-in-hospitals in Europe was followed by a great falling off in ophthalmia neonatorum, as you know. The man who introduced it is worthy of our gratitude.

The method, however, has fallen into more or less disrepute owing to the disastrous results which have followed its supposed use, such as severe conjunctivitis, bad scarring of the cornea or even fatal hæmorrhage. The first two I have seen, and some cases of the last have been reported, though it is probable that other factors were the primary cause of the hæmorrhage.

You notice I say its supposed use; I think it is most likely that

many persons thought they were using the Credé method when, instead of one drop they were using several, and instead of letting the eyelids close gently, they manipulated them to insure the thorough application of the remedy to the conjunctiva, and by this manipulation they more or less injured the corneal epithelium. The strength of the solution may have been correct, viz., two per cent.; but the quantity used was not. The Credé method was a single drop allowed to drip from a glass rod. In the supposed use of the method, a dropping tube was probably substituted for the glass rod; and on the theory that if one was good, more would be better, several drops instead of one were put into the eye. If anyone wishes to use the two per cent. solution, let him take great care to use it as Credé recommended, using only a single drop for each eye. If this precaution had always been taken I think the unfortunate results which we have seen would not have occurred.

Owing to the carelessness with which it would probably be handled, I would not recommend the general use of a two per cent. solution of nitrate of silver at the time of birth. In the confusion attendant upon the delivery of the child, the constant vigilance which the mother requires at this time, the modern dropper conveniently at hand, and the honest desire to do thorough work, many physicians would use too large a quantity of the solution, and thus do more or less damage to some eyes which if left alone would have no trouble. I think any law would be criminal which required every physician to use two per cent. solution of nitrate of silver in the eyes of every child that he delivered.

These objections with regard to the attempt to use the Credé method on the one hand, and an appreciation of the terrible scourge of ophthalmia neonatorum on the other, have resulted in attempts to find other methods which shall be as effective and yet free from the dangers attendant upon attempts to use the Credé method. Various plans have been suggested and tried: flushing the conjunctival sac with sterile water; with a two per cent. boracic acid solution; dropping into the eyes a one per cent. silver nitrate solution, a one per cent. bichloride of mercury solution, iodine trichloride solution, etc.

In the statistics which I have been able to find the lowest percentage of ophthalmia neonatorum occurred where the Credé method or some modification of it had been used.

On the subject of prevention of ophthalmia neonatorum by

the care of the child's eyes at the time of birth, the ophthalmic surgeon's views must be theoretical, as he has no opportunity to treat such cases and to observe the results of his treatment. The obstetricians are constantly in contact with them and have the opportunity to determine what line of precautions or treatment gives the best results. The ophthalmic surgeon from experience with the treatment of conjunctivitis in its various forms after its development, and from his familiarity with the remedies used, and the results which they produce, may be able to give the obstetrician helpful suggestions.

The very extensive laboratory experiments by Wilbur E. Post, and Homer K. Nicoll on "The Comparative Efficiency of Some Common Germicides" (published in the *Journal of the American Medical Association*, Nov. 5, 1910) supports our confidence in silver nitrate. Solution as weak as 1-1000=1/10 of one per cent., or gr. ss. to ʒj, destroyed all the gonococci in a solution in one minute. The rapidity of action is a very important consideration in selecting a germicide to prevent ophthalmia neonatorum.

Post and Nicoll studied the effect upon the gonococcus of argyrol, protargol and silver nitrate in various strengths, noting the result after one minute, ten minutes, thirty minutes, and twenty hours. They also studied in the same manner the effect of solutions of mercury salts, phenol, solutions of iodine formaldehyde, alcohol and many others.

They close their paper with various conclusions, only the first of which I will quote.

"The results established under these conditions the following points: 1. The reliability of the prompt action of a few simple germicides, such as tincture of green soap, alcohol in solutions above fifty per cent., silver nitrate solutions as diluted as 1 to 1000, the iodide solutions either as the tincture, or in aqueous solution with potassium iodide, phenol in five per cent. solution."

From a study of their paper one feels that solutions of silver nitrate are, considering their efficiency and convenience, the most practical means of preventing this disease.

Sidney Stephenson in his book, "Ophthalmia Neonatorum," makes a very extensive and very exhaustive study of the prevention of this disease, and in speaking of silver nitrate solutions says: "On the evidence before me I therefore conclude that the one per cent. solution is fully protective, and in our present state of knowledge may be regarded as the most efficient solution to employ in the preventive treatment of ophthalmia neonatorum."

A remedy which Stephenson mentions rather favorably, but which he seemingly considers has not been tried in enough cases (1500) to establish its claims as a trustworthy germicide, and which Post and Nicoll do not mention, is sophol. The chief advocate for the use of sophol as far as I know is Prof. Otto von Herff, of Basel, Switzerland. In a contribution by him in 1910 he reports 7,536 cases treated, some with ten per cent., but most of them with five per cent. solutions. There was one case of early infection—.00013 or .013 of one per cent.—and the same number of late infection. As described, two or three drops of the solution are placed on the closed lids of the child or at the inner canthus; the child either opens the eyes itself or they are opened by the physician or nurse, and in this manner the solution finds its way into the conjunctival sac.

Sophol is a combination of methylen nucleic acid with silver. It contains twenty per cent. of silver in organic combination. In five per cent. solution it is said to be unirritating. I have used it in two per cent. and four per cent. solutions in slight and severe cases of conjunctivitis, producing almost no discomfort, but my experience with it has been too small to be of any value.

I have had the pleasure of seeing the manuscript of an article by Dr. March Pitzman of this city, "The Antiseptic and Germicidal Properties of the Silver Salts and Preparations." In it he states his belief that the germicidal power of the preparations of the albuminates of silver depends upon their containing a free excess of silver nitrate, and from that point of view are only dilute solutions of silver nitrate.

In this connection it may be well to consider the contention of Dr. Rudolph Schneider (*Graefe's Archives*, Vol. LXXXIII, No. 2, p. 223), an extract of which, made by Dr. Adolf Alt, appeared in the *AMERICAN JOURNAL OF OPHTHALMOLOGY* for March, 1910.

Dr. Schneider holds that the value of the remedies which are used in curing inflammations of the conjunctiva does not depend as much upon their own germicidal power as upon the fact that "After instillation of silver nitrate, protargol and zinc sulfate, leukocytes wander into the conjunctival sac, and under the influence of these agents secrete their bactericidal substance, the 'leukins'." If this is true it explains some of the results which we get clinically and which laboratory experiments with the same remedy would not lead us to expect.

In conclusion we would say that it has been amply demon-

strated that ophthalmia neonatorum can be prevented or very much lessened.

We would suggest examination of the vaginal secretion for pathogenic germs a short time before confinement, antiseptic vaginal douches in the early stages of labor, cleansing of the child's face and hands with clean water, not with that which has been used to wash the child's body.

The crucial question is: Shall the Credé method be used in all cases of confinement? I would say most emphatically, no. I believe that in skilled hands the Credé method can be used with a large degree of safety. Yet it must be very painful. If any one doubts this, let him put in his own healthy conjunctival sac a solution one-fifth as strong, after which he would object most strenuously to the use of a two per cent. solution in his eye. It seems to me very severe to subject the child of morally and physically clean parents to the pain which the instillation of a ten grains to the ounce solution of silver nitrate must cause. There is certainly great danger from its use in the hands of those who do not follow exactly the instructions given by the originator of the method.

I believe that where the gonococcus is present a one per cent. solution of silver nitrate is efficient, and probably several drops of a much weaker solution, even as weak as one grain to the ounce would be adequate. The use of a solution of this strength would be comparatively painless, and almost free from risk, unless possibly in the case of a hæmophile.

It remains for some one in the light of our laboratory knowledge, with large clinical opportunities, to try the efficiency of the weak solutions of silver nitrate; one grain to the ounce or two-tenths of one per cent.

An unfortunate thing, and one that militates against the use of preventive measures, is the fact that the laity has been educated to the belief that ophthalmia neonatorum means gonorrhœa in the mother. Hence attempts to prevent it indicate that the obstetrician suspects that the mother has gonorrhœa. They should be taught that other germs than the gonococcus may cause ophthalmia neonatorum. With that understanding preventive measures might be used without seeming to insinuate a distrust of the moral cleanness of the parents.

Disastrous results may be caused by using preventive solution too freely where only a single drop should be used. The corneal epithelium may be impaired in attempting to open the eyes, or in

manipulating the lids to make sure that the remedy reaches all parts of the conjunctival sac.

All obstetricians should familiarize themselves with the exact manner in which the medicines should be used. They should remember that there is great danger of injuring the cornea in manipulating the eye-lids when the medicine is introduced. They should themselves make the applications, and not leave it to the nurse.

I believe that the intelligent, well trained obstetrician (and there should be no other), bearing all these things in mind, is competent, and should be allowed to decide whether or not to use prophylactic solutions in the eyes of the children whom he delivers.

INTRA-UTERINE OPHTHALMIA NEONATORUM.

W. A. Newman Dorland (*Jr. A. M. A.*, Oct. 14, 1911) says that there are about one hundred cases recorded in medical literature in which ophthalmia neonatorum developed intra-uterine. In about 37 per cent. of these cases premature rupture of the membranes is noted while in 63 per cent. of the cases the rupture took place within twenty-four hours of the birth of the child, too late for the infection to occur by this route and the development of the disease before the child was born. He says that Sydney Stephenson believes that in most cases penetration of the intact membranes by the germs occurs after a local intra-uterine infection. The author reports a case in which he believes the infection occurred because of premature rupture of the membranes as this took place seven days before the birth of the child. When, immediately after the child was born, the nurse attempted to instill the silver solution in its eyes it was found that an advanced gonorrhœal ophthalmia was present, there being a profuse greenish pus in each eye. In spite of the best care that was given the eyes a perforation occurred in one the next day and it was destroyed, while the other resulted in almost complete corneal opacity from ulceration.

PHANTOM FOREIGN BODIES WITHIN THE EYE.

BY ADOLF ALT, M.D.,
ST. LOUIS, MO.

The relation of the following experience may be, perhaps, of some use by showing the possibility of an error in the picture of an X-ray plate, whether from the same source as in the author's case or any other similar one.

E. R., a boy of 9 years of age, was brought to me on November 5th with the statement that he had received an injury to the left upper lid and eyeball on November 1st. Inquiry as to the manner in which the injury was received elicited nothing definite,



since the boy absolutely refused to talk about it. The relatives thought that he had run against a door and, perhaps, been injured by a protruding nail. Later on they thought they had found out that he had been struck in the eye by another boy with a whip.

When I saw the boy for the first time there was an abrasion on the upper lid to the nasal side. The lids were slightly swollen. The eyeball was greatly congested and there was chemosis. In the nasal upper quadrant I found a wound in the corneoscleral junction about three millimeters long through which some vitreous body protruded and in which the periphery of the iris, which had, of course, also been perforated, was fastened. Through the little hole in the iris some pus could be seen lying in front of the ciliary body. The pupil was wide but slightly displaced towards the wound. The lens was opaque. $V=0$. Atropin was instilled and xeroform powdered on the wound and the eye bandaged. Internally bichloride of mercury was ordered. While under this treatment the general congestion and chemosis disappeared rapidly, yet the iridocyclitis progressed and a week later a hypopyon was found. Now an X-ray plate was made for me by Dr. Carman which to my astonishment showed a number of foreign bodies within the eye (see figure) which were rather strangely placed. Again we plied the boy with questions as to the real nature of the injury but could not get anything out of him. The X-ray picture seemed to demand the removal of the eye, yet the severity of the symptoms was getting less and less, and the fellow eye showed no signs of any sympathetic irritation, although the iridocyclitic process was still going on and the pupil was gradually contracting towards the seat of the injury. In view of these facts and of the age of the patient I could not convince myself that it was necessary to remove the eye as yet. In the following two weeks the wound healed, the eyeball became less and less injected, a little hypopyon could still be seen for a day or two and then disappeared, and evidently the eye was recuperating from the severe inflammation. Of course, I watched with anxiety the condition of the fellow eye, but nothing untoward occurred.

Two weeks after the X-ray picture had been made while dusting xeroform into the boy's eye, the thought struck me that the peculiar foreign bodies apparently lying within the eyeball might, perhaps, have been the shadows of bismuth contained in the xeroform powder. Dr. Garstang then made a second X-ray photograph after I had made sure that there were no xeroform particles in the conjunctival sac. This plate, to my satisfaction, showed no foreign bodies in the eye whatever and I felt that it was not, at any rate for this reason, my duty to remove the eyeball.

The case has now been under observation for six weeks and is

doing well in every respect. The eye has now light perception. The lens is perfectly opaque. The fellow eye shows nothing abnormal.

As I have examined a number of eyes which were removed, after an X-ray picture had apparently revealed the presence of a foreign body in the eye, in which, however, I was absolutely unable to find any foreign body, the question seems justified whether there was, perhaps, not in some of these cases a similar source of error. I think that it is worth while to put this case on record for this reason alone, as it is otherwise of no special interest.

TRANSLATIONS.

THE ACTION OF SALVARSAN IN EYE DISEASES.*

BY PROFESSOR W. DOLGANOFF,
ST. PETERSBURG.

(Translated by A. Alt, M.D.)

One and a half sobering years has passed since the renowned 606 preparation of Ehrlich, salvarsan, arsenobenzol, or by its chemical formula Diamidoarsenobenzolchlorhydrat, has been put on the market, a preparation which owes its success not only to its true healing qualities, but also to the alluring theory of a *therapia sterilisans magna*, which, it is claimed, can be obtained with it.

Every journal brought (and brings) clinical and laboratory news which acted encouragingly or discouragingly, and different short-lived theories as to its power and the results of its definite action. It seems probable that the period of noisy battle between the supporters and opponents of the new remedy is passed, that the time of unwarranted exaggeration and negation has in view of the accumulated facts given place to a more quiet and cool blooded behavior. It will still take some months before a good part of the metaphysical weighing and of the beautiful hypothesis will have been thrown aside and the enigmatic arsenobenzol will become a simple, clear, perfectly precise remedy just like mercury which by the partisans of the new faith has been so unjustly devaluated.

In the general as well as in the medical press so much has

*Berliner Klin. Wochenschr., November 6, 1911.

been written on salvarsan, its physical and pharmaceutical peculiarities, its pharmacology, on its bactericidal and other faculties, on its benign and malignant influences, on the direct and indirect effects produced by it, etc., that I think it superfluous here to repeat these things. I pass on directly to the discussion of those questions which arise when the new remedy is employed in ophthalmic practice. The following are the main questions:

1. Does salvarsan act as a poison on the eye?
2. Does it have a special elective toxic action on the organ of vision so that it attacks it quicker and more strongly even in small doses which are inactive in other organs?
3. What kind of clinical pathological pictures are produced by salvarsan in the different parts of the eye? Can they be characterized as definite clinical forms of type of inflammation or atrophy?
4. Which systems or parts of the eye react especially quickly and strongly on salvarsan?
5. Is the action of salvarsan the same in a perfectly healthy eye as in one which though not diseased at the time of action of the arsenobenzol, shows certain symptoms of deviation from the norm consequent upon a former eye affection or a present general disease which sometimes affects the condition of the eye?
6. Is the action of salvarsan in truth a beneficial one in eye affections? What forms of eye diseases are favorable to the treatment with salvarsan? How quick and how persistent is the effect of its action?
7. How often do relapses of the affection occur after the use of salvarsan? Does it afford a guaranty against the appearance of a new or of the same form of affection in the cured eye and against an affection in the hitherto healthy fellow eye?
8. What are the contraindications in the eye against the use of arsenobenzol?

It is clear that it is difficult to give a precise answer to all these questions, yet we can arrive at certain conclusions; we can compare papers and the results published in literature as was done in Stuelp's work and in the March number of the *Annales d'Oculistique* in the *Révue générale*.

The material and observations detailed in the following may serve for completion.

On account of the fear of the new unknown preparation and its possible deleterious action of the eye, which has even been mentioned several times by its inventor, my patients divided themselves into two groups.

(1) The patients with perfectly healthy eyes who demanded an eye examination in order to report to other specialists, because these were never satisfied to make an injection without the examination and permission of an oculist. In this they follow Ehrlich's advice who advised that individuals with beginning atrophy or simple bad nutrition of the optic nerves should not submit to the injection. (2) Patients with eye affections who from the nature of their disease needed treatment with arsenobenzol. The patients of the first category, those with perfectly healthy eyes who for other reasons needed salvarsan treatment, numbered 300. They were examined before the injection and with few exceptions one or two months after it. In not a single case was there any deviation from the norm which could have been laid to the action of the arsenobenzol treatment on the eye. The patients themselves who had been warned of the possibility of complications after the injection and who observed their eyes carefully could not find any abnormalities in the act of vision. (Complications in other parts of the body do not belong here.)

From the foregoing it is evident that arsenobenzol in ordinary, single and repeated doses (0.6 subcutaneously, 0.4 to 0.5 intravenously) produced no pathologic changes whatever in healthy eyes; thus the question of the electivity of its noxious action on the visual apparatus is eliminated. Perhaps, I was in this point especially fortunate in the selection of my cases, for there are in literature, if not many and still doubtful, a number of statements which grant salvarsan with the faculty of causing diseases of the eye.

Thus Gilbert attributes to it the production of nystagmus, Wechselmann of conjunctivitis, Greef a certain ring in the choroid, Fischer anisocoria, Kowalewzki, Wechselmann, Rille, Finger, Spiethoff, Stern, Antonelli and others of paralysis of the motor nerves and of inflammation of the optic nerve, but I shall speak on these more extensively later on. These statements have been pretty successfully opposed by other observers, especially by Flemming and Tobias. They see the cause of the origin of the secondary affections just mentioned not in the arsenobenzol itself, but in the incomplete methods of injection, in the dosage of the remedy, and especially in the severity and malignancy of the original process which remained unconquered by the dosis of the remedy injected into the organism and were not even reduced by it. For unknown reasons this dosis was

insufficient, even completely neutral. In every case such statements should be made with the greatest care in order to solve question 5 (questions 3 and 4 are answered in the negative by my experiences); that means, whether salvarsan is not equally inactive for sound eyes, if their optic nerves show deviations from the norm and a lowered nutrition. Here we think especially of the pretty frequent cases of pale or decolorized papillæ in individuals who have had some neuritis or in those who suffer from tabes, progressive paralysis or sclerosis *en plaques*, etc.; in these cases there is no beginning atrophy, because these eyes preserve their acuity of vision. Such a picture of the optic nerve which shows only a lowering of the nutrition and proves the participation of the eye in the general affection, was the cause that I advised patients to desist from the use of 606, and many cases of this kind acted according to my advice. Yet, the unsuccessful treatment of the general disease with the ordinary old methods and the continued progress of the affection prompted several of these despairing patients to risk the use of the new and unstudied preparation. Further observation showed that in such cases, too, arsenobenzol proved an innocent remedy which did not impair the aspect and the physiological faculties even of such altered optic nerves. (Here follow the histories of 4 such cases).

Of course, the number of such observations does not suffice for precise conclusions. However, they show that in eyes with tabetic, syphilitic or any other pallor of the optic papilla 606 does not cause the development of a real optic nerve atrophy. Although this fact must be supported by further observations, my experience is of great importance since it shows the possibility of trying the new remedy even when atrophy is present.

Thus according to my observations salvarsan has no noxious effect on perfectly healthy eyes nor on eyes with a pale optic nerve. This fact being established, let us take up question 6, that is, on the influence of arsenobenzol on different forms of eye affections. At present not only syphilis and in general spirochaete affections, but all sorts of other diseases, beginning with tuberculosis, are being treated with salvarsan.

Ophthalmologists have followed the general example and have employed salvarsan, aside from lues, tuberculosis, etc., also in a totally different eye affection, the ætiology of which is unknown, namely sympathetic ophthalmia. The results obtained differed. I myself have not used salvarsan in this disease. All of my

patients without exception suffered from syphilis, one only had malaria.

All of them were before the injection carefully examined by specialists for venereal diseases, inner or nerve diseases; in all cases a Wassermann test was made and analysis of the urine. At first the injection was made subcutaneously, of late always intravenously. It was repeated from 2 to 4 times. I studied the effects of salvarsan on atrophy of the optic nerve, paralysis of the internal and external eye muscles, on optic neuritis of different types, intraocular hæmorrhages, opacities of the vitreous body, iritis and iridocyclitis (on the cases of parenchymatous keratitis my assistant, Dr. A. Lotin, will report).

GROUP I.

Atrophy of the optic nerves.—Although according to Ehrlich atrophy precludes salvarsan treatment, we were in some cases forced to use it by the urgent demands of the patients even in the presence of atrophy. The first injection was given to a patient with bare light perception on account of his own demand and in agreement with the propositions of the syphilologist and the neuropathologist who had been unable to stay the progressive destruction of the organism with the usual valuable remedies. (This case has been reported previously by me.) In spite of the favorable, if extremely slight result of the first trial, I did not recommend arsenobenzol very urgently to other patients who had optic atrophy. All of these cases underwent the salvarsan treatment from their own desire and without any responsibility on my part. Their whole number was 7.

1. White atrophy, dorsal tabes, Wassermann strongly positive, V=p.l. Fundus with characteristic changes. Sept. 25th subcutaneous injection of 0.6 arsenobenzol. Oct. 8th, of 0.6 intravenously. On Oct. 20th Dr. Gorbunow and I observed a distinct change in the appearance of the inner half of the papilla, which was colored half red. General condition improved to an astonishing degree. Nov. 10th, third injection, of 0.75 and Dec. 4th a fourth of 0.6. Vision increased sufficiently for the patient to find a small coin, the head of a match, etc., on the table, but he could distinguish these object with great difficulty only; he had to look a long while before recognizing their form.

2. W. Tabetic atrophy. V.R.E.=10/100; L.E.=5/100. Vision is going rapidly. Subcutaneous injection of 0.6 salvarsan. Two months later no change.

3. P. G. Tabetic atrophy. V.R.E.=0; L.E. 20/40. Salvarsan intravenously. Four months later unchanged.

4. M. Tabetic atrophy, lues, Wassermann of the blood negative, of the cerebrospinal fluid positive; every form of general and local treatment had been tried. Sept. 8th, 1910, R.E.V.=20/100. Field very contracted, reduced color perception. L.E., pupils small, do not react to light; field small; V.=20/40. Nov. 16th, subcutaneous injection of 0.6 salvarsan. Nov. 6th, intravenously 0.4. May 15th, 1911, R.E.V.=20/100; L.E.V.=10/40. Fields unchanged. Papilla R.E. perfectly atrophied, many blood-vessels still visible in inner half in L.E. According to the intelligent patient salvarsan has in the L.E. rendered the progress of the atrophy less rapid and stayed it altogether in the R.E. The objective symptoms agree with the patient's judgment.

5. L. Atrophy of both nerves, Wasserman negative, but lues was present without a doubt 3 years previously. Sept. 27th, 1910, patient had optic neuritis, outlines of the papillae indistinct, but with distinct beginning of atrophy. R.E.V.=5/200; L.E. 10/100; careful inunctions, iodid, salicyl, baths, strychnin injections in temples. Feb. 26th, 1911, V. both =12/200; field to 40°, papillae bright white. Mercury abandoned. April 24th, 1911, intravenous injection of 0.4 arsenobenzol. No change whatever one month later.

6. K. Tabetic atrophy; lues 10 years previously, Wassermann positive. Late in October, 1910, patient noticed sight failing. At his wish, Dec. 9th, 1910, salvarsan 0.5 subcutaneously. I saw him first on Dec. 14th, 1910. R.E.V.=6/100. L.E.=15/100; field 40°. Jan. 12th, 1911, R.E. 5/100; L.E. 15/100; has taken iodid and strychnin all this time. Feb. 6th, 1911, R. 12/200; L.E. 15/100. Intravenous injection of salvarsan 0.4. Feb. 27th, 1911, R.E. 10/200; L.E. 13/200, this means a rapid decline.

7. H. Lues of the brain, atrophy of both optic nerves. On October 9th, 1910, patient came with very white atrophy, V.R.E.=15/100; L.E. 1/100. Wasserman positive. Nov. 10th, 1910, arsenobenzol subcutaneously 0.4. Feb. 16th, 1911, intravenously 0.4. Feb. 22d, 1911, V.R.E.=10/100; L.E. 1/1000. Three months later V. the same. Patient had taken iodid continuously and strychnin was injected subcutaneously.

Thus the injections of salvarsan in cases of atrophy of the optic nerves gave me the following results: slight unimportant improvement in one case; slower progress of the disease in one

case; stopping of the process during one to four months of observation in four cases and in one case as rapid a decline of vision as had been noted before the injection. All of this speaks in favor of arsenobenzol since in general a certain halting of the process is observed. Statements in literature are scarce and indefinite. Flemming, too, saw no success in atrophy, but also no detriment and confirms the communication by Grosz, who does not consider atrophy as a contraindication to salvarsan. Schnaudigel is afraid to give an opinion based on one case, but even this doubt is rather in favor of salvarsan. Seligsohn saw no increase of the atrophy, but Clausen saw loss of vision in juvenile tabes. Gorbunow saw success in one case from repeated salvarsan injections. Stuelp concludes from statistics that arsenobenzol was successful in 25 per cent. of all atrophies of the optic nerves from varying causes. At any rate it is clear that arsenobenzol has no deleterious and hastening effect on the degeneration and blindness. Its action is more or less satisfactorily explained by numerous theories thus far proposed. Of course, salvarsan cannot rebuild nerve tissue, nor change scar tissue into nerve tissue; but by killing and paralyzing the cause, by improving the general health of the patient it gives the disintegrating and not perfectly destroyed nerve elements a chance to regain their function and, perhaps, may preserve for ever the fibres and cells which are not yet affected.

GROUP II.

Degenerations of the ocular muscles. I observed 12 cases.

1. M. Dorsal tabes; unequal pupils, no light reflex, after two injections of arsenobenzol no change was observed in the course of 6 months. (Wassermann positive.)

2. G. Dorsal tabes; paresis of right sphincter pupillæ; Wassermann positive; after 0.6 arsenobenzol injection no change in 3 months.

3. Paresis of abducens came on in L. several weeks ago; Wassermann positive. Two months after arsenobenzol injection according to his physician (his brother) a perfect cure resulted. A paresis of the sphincter pupillæ and the accommodation, found 1½ years previously, remained unchanged.

4. N. Paresis of L. sphincter pupillæ. Wassermann positive; the inequality and the weak reaction to light had been noticed by the patient herself for a long time, but thought to be irrelevant. Two intravenous injections of salvarsan brought about no change.

5. T. Sept. 14th, 1910, patient came with dilatation of the pupil and paresis of the accommodation R.E. Usual treatment useless. Arsenobenzol 0.5 subcutaneously. After 6 days contraction of the pupil followed by some dilatation a week later; again contraction a month later and the paralysis of the accommodation disappeared.

6. W. Dorsal tabes, spinal miosis. No change after injections.

7. P. Lues many years previously; Wassermann positive. Feb. 1, 1910, paresis of right sphincter. On account of the increasing weakness of the patient, the continued deterioration of his general condition and the negative result of specific and roborating treatment, 0.2 salvarsan was injected subcutaneously. Three months later no change.

8. J. Lues 18 years previously. Pupils dilated, the right irregular in shape, with weak reaction to light, and paresis of accommodation in R.E. This condition has existed for several years. Intravenous injection of 0.4 salvarsan. After two months no change.

9. Lues several years previously. Recent paralysis of L. oculomotor Dec. 23d, 1910. Severe headache. Nearly a month of the usual energetic treatment made no change. Dec 17th 0.4 arsenobenzol intravenously. Dec. 23d patient can open the palpebral fissure to 3 mm. and move the eye nasally distinctly. Feb. 12th, 1911, slight ptosis; eye movements almost normal. Still paresis of internal rectus, eye in abducted position. March 24th, slight dilatation and reduction in accommodative power. Position of eye normal. The right pupil (hitherto the sound eye) is widely dilated, paralysis of sphincter. Reaction to light poor in both pupils. April 30th, nothing abnormal in either eye, except a slight abduction of the left eye when looking upward.

10. S. Lues 24 years previously. Wassermann positive. Feb. 5th, 1911, incomplete paresis of R. oculomotor. Feb. 13th, arsenobenzol 0.4 intravenously. On Feb. 28th the parietic symptoms are less, but on account of some general symptoms weak doses of mercury and iodid are given. March 10th, only traces of the former parietic symptoms, but a paresis of the left external rectus, sphincter and accommodation has appeared. April 15th, intravenously arsenobenzol 0.5. May 12th, the parietic symptoms no better (except the accommodation). Inunction and a cure at a bathing place in the Caucasus are recommended.

11. K. Luetic oculomotor paralysis. Wassermann strongly

positive. Complete oculomotor paralysis in October, 1910. Energetic antisyphilitic treatment unsuccessful. In February, 1911, the paralysis was unchanged. On Feb. 23d, salvarsan 0.4 intravenously; a week later the headache disappeared, after two weeks the patient could open the eye to the pupil with a maximum contraction of the levators and frontals. A second injection a month later. March 15th, pupil dilated, accommodation almost completely paralyzed. Eye in strong abduction, arc of motility incomplete. The palpebral fissure is always 5 mm. high.

12. K. Lues 10 to 11 years previously. Wassermann positive. In November, 1910, right oculomotor paralysis. Mercury and iodide. Dec. 18th, no result. Salvarsan 0.4 intravenously. No visible result 1½ week later, mercury and iodide resumed on the advice of the syphilidologist and neuropathologist. March 7th, 1911, palpebral fissure wide open, pupil slightly dilated. Eye in abduction; arc of mobility almost normal.

The following are our conclusions from these cases:

1. The old paralyses (having existed more than a year) of the interocular muscles have remained unaltered (7 cases), whether they had developed on a purely syphilitic or a tabetic basis. Two of the three recent syphilitic paralyses showed a favorable and pretty rapid success.

2. Of two cases of recent paralysis of the extraocular muscles one showed no change after salvarsan, the other healed quickly.

3. The treatment of complete oculomotor paralysis gave good results, in two cases even brilliant ones; in the other two cases the result was as good as if mercury had been used.

We must, therefore, acknowledge a good result from the use of salvarsan in recent paralyses of the eye muscles, especially if we take in account how difficult it is in general to cure paralyses of the eye muscles. This action of arsenobenzol is fairly well established in literature. Thus Lapersonne saw a transient improvement of ophthalmoplegia; Seligsohn, Milias, Landrien had negative results in uniocular paralyses; Flemming saw transient improvements; Schnaudigel, Pierre Mary, Levy and Barre, Wiho, Guttmann, Gorbunow saw improvements and complete cures. Stuelp gives 25 per cent. of successes in his statistics. My own observations are in favor of it in every case.

GROUP III.

Inflammations of the optic nerve. Seven cases of different kinds were observed.

1. E. Cerebral lues. Wassermann positive. Neuritis ascendens both eyes. Had been treated in the usual way for more than 6 months. V. in December p.l. April 10th, 1911, as a last resort salvarsan, 0.5 intravenously. May 13th, less stasis, great general improvement; walks securely, no more headache. V. the same. Recommended mercury, sweating, and iodide.

2. M. March 4th, 1911. Disease more than 6 months old. Has been treated by specialists, but carelessly. Denies syphilis. Neuritis ascendens in both eyes. Neuropathologists suspect cerebral syphilis. Wassermann strongly positive. V.R.E. 20/15, H. 4.6 D; V.L.E. 20/4, H. 3.25 D. Field and light sense normal. Mercury, sweating and iodides. Some improvement a month later. Injection of arsenobenzol (0.4 intravenously) March 30th. Two and a half months later V. the same. Swelling and inflammation of optic nerves much better. On account of the severity of the process, patient had received 30 doses of mercury in the last 6 weeks and hot baths.

3. S. Lues 24 years previously. Slight optic neuritis both V.=20/30 on Feb. 5th, 1911. A week later arsenobenzol 0.4 intravenously. Feb. 25th, neuritis worse; second injection of 0.5 April 15th. May 12th outlines of discs barely visible. Mercury and Kaukasus baths. Wassermann strongly positive before and after injections.

4. G. Lues. Slight optic neuritis found a month previously. Dec. 7th, 1910, M. 2.5 D.; V. 20/20 Wassermann strongly positive. Dec. 18th 0.4 salvarsan intravenously. Gradual general improvement. Eyes the same. In March, 1911, patient feels worse again. April 20th, 1911, V. and light sense normal, L.E. hemianopsia. Neuritis L. unchanged. Arsenobenzol 0.4 intravenously. Two weeks later no change. Ordered mercury and iodide.

5. O. Optic neuritis both. Wassermann strongly positive. Had been treated by the best physicians, yet for 1½ year V. had gradually been almost lost. Oct. 11th, 1910, V.=1/200, extreme contraction of fields. Almost total veiling of disc outlines. Nov 20th, intravenously arsenobenzol 0.5. Dec. 18th, V.=20/70, field unchanged, outlines of disc better. Dec. 28th, V.=20/50, field 30°, reads and goes into the street without help. Iodide internally, strychnia subcutaneously. Middle of January, 1911, vision again poorer. Hyperæmia of papillæ, outlines indistinct. R.V. p.l.; L.V. 1/200. Patient hysterical, demands another injection. Feb. 12th, injected 0.5; Feb. 17th, unchanged.

March 9th, V.R. 20/50, L.V. 20/70; April 20th, R.V. 20/30, L.V. 20/40. Fields almost normal.

6. T. Lues many years ago. Wassermann strongly positive. Sept. 5th, 1909, strongly pronounced optic neuritis, L.V. reduced to p.l. Mercury, iodide, diaphoretics. Nov. 7th, V.=2/200; Jan. 9th, 1910, down to p.l. Ophthalmoscopically no change. Energetic general treatment, with strychnia added. After various ups and downs on Jan. 7th, 1911, an intravenous and Jan. 9th an intramuscular injection. April 30th, V.=20/20, field normal; outlines of papilla much clearer, papilla whitish. Ordered iodide and injections of strychnia.

7. B. No signs of former syphilis, but Wassermann positive. Patient noticed diminution of V.L. in December, in R. a month ago. R.V. 20/200, papilla reddish; L.V. 3/200, temporal half of disc whitish (disparity between vision and ophthalmoscopic picture). March 27th R.V. 3/200, very rapid loss of V. without ophthalmoscopic explanation. Ordered tonica, diaphoretica, strychnia and mild mercurial injections. April 4th V. p.l. Neuropathologists suspect *sclerose en plaques*. Inner organs normal. April 8th V.=0. Intravenous injection of 0.4 arsenobenzol. Temporal half of R. papilla getting pale. Neuritis toxica is diagnosed. May 4th arsenobenzol 0.4 intravenously. No change. Inunctions with collargol also useless.

An analysis of these cases, all on a syphilitic basis, mostly neglected, badly and unsatisfactorily treated, does not lead us to consoling conclusions concerning the magic effect of salvarsan in such cases. We must state, however that sometimes the general condition was quickly and much improved, headaches disappeared, etc.; yet there were also cases in which the general condition and that of the eyes grew worse. In two cases of choked disc arsenobenzol treatment yielded so slight an improvement in the ophthalmoscopic picture that we returned to mercurials and diaphoretics. Things were somewhat better in cases of neuritis descendens. We may point to the good result in case 5, in which the usual treatment had been useless; in case 6 arsenobenzol strengthened, so to speak, the result of mercurial treatment and cleared the outlines of the disc; in case 4 arsenobenzol gave no convincing result; in case 3 it was absolutely useless and symptoms appearing in other organs necessitated the use of mercury. The same was observed in case 7 (neuritis toxica). Thus we get the impression of a certain variability and uncertainty concerning this preparation; sometimes its heal-

ing power is strong and energetic, sometimes from unknown causes it is weak, in some cases even neutral. The future will clear up this peculiar behavior of salvarsan when used in cases with the same ophthalmoscopic picture and the same aetiology. A similar difference of opinion is found in literature.

Lapersonne, at first positive result, then rapid serious relapse. Michaelis, good result in choked disc from cerebral tumor. Flemming, sometimes positive effect, sometimes none. Schnaudigel, good effect, but not invariably. Excellent effect in one case in which mercury was absolutely useless. Stuelp, one case successful at first, rapid relapse later. Neuhaus, no deleterious effect on the optic nerve even when previously diseased.

From my own cases, supported by this literature, I must agree with some syphilidologists, that arsenobenzol is a wonderful ally of mercury, which in some cases increases its action, in others overcomes the disease alone. It is impossible to know the cases beforehand, therefore we must use both remedies conjointly.

GROUP IV.

Inflammations of the iris and ciliary body. Five cases were seen.

1. P. Papular iritis, L.; two large papules on the iris and numerous firm synechiæ; little pain. Patient sick for 5 weeks, no treatment. Sept. 25th, 1910, atropin and mercurial inunctions. Sept. 29th, unchanged. Oct. 26th, patient says he has to give up treatment. Eye in very bad condition; a number of dark papules over the whole iris surface; pain, severe inflammatory symptoms. Oct. 30th, arsenobenzol 0.5 subcutaneously next day, no pain. Nov. 5th, papules smaller, flatter, several small ones gone. Nov. 10th, inflammation gone, the old synechiæ remain.

2. M. Plastic iridocyclitis. Patient denies lues, accuses malaria. Has been sick for 3 months with varying intensity. Nov. 1st, 1910, medium inflammation, slight pain, typical plastic iridocyclitis, synechiæ. Nov. 3d, arsenobenzol 0.5 subcutaneously. Nov. 9th, inflammatory symptoms completely gone. June 6th, 1911, no relapse, all exudation and synechiæ absorbed.

3. S. Luetic papular iritis. Sick 2 weeks, used home remedies. Jan. 15th, 1911, red papules, considerable exudation, many posterior synechiæ; great pain. Local treatment (cupping, atropia, hot compresses), salvarsan 0.5 subcutaneously. Patient disappeared from observation. July 15th, he states that the pain

disappeared quickly, after a week only slight redness which persisted for a month. Being so much improved, decided to abandon treatment. Posterior synechiæ.

4. J. Lues 7 years previously. Wassermann positive. A year ago both eyes diseased. Jan. 12th, 1911, R.E., large vitreous opacities, detachment of retina, posterior synechiæ. V. 1/1000, p.l. irregular, L.E. vitreous opacities, posterior synechiæ. V. 20/40. Jan. 15th, salvarsan 0.4 intravenously. Jan. 21st, no change. Two months later L.E.V 20/30, R.E. p.l. no change visible.

5. M. Syphilis 5 years previously. Three years ago L. keratitis, since corneal opacities. Dec. 10th, 1910, had severe iridocyclitis which was treated with salvarsan. No rapid improvement; inflammation disappeared very gradually. May 10th, 1911, severe relapse of iridocyclitis in the same eye. Recommended salvarsan and mercury. Patient disappeared.

The favorable results obtained, as seen from these observations, in affections of the anterior part of the vascular system of the eye, prove the specially curative effect of salvarsan on this group of diseases, especially the cases with infiltration. In cases 1, 2 and 3 a cure was obtained (without other treatment) in a few days. Such facts rob even those who oppose the new remedy from principle of the right to malign it. This opinion is supported by other authors, who confirm the value of arsenobenzol in syphilis of the anterior part of the ocular vascular system.

Very good results in iritis, etc., have been seen by Igersheimer, Siegrist, Kalt, Landrien, Flemming, Schnaudigel, Lapersonne, Miklaschewski, Morax and Fourrière, etc. Stuelp places the percentage of cures in these forms at 63. He, also, reports unsuccessful cases, as did Finger, Lapersonne, Igersheimer, and others. Schnaudigel detailed some prolonged cases; Langenhans some without success and even deterioration. But, these few unsuccessful cases disappear under the mass of favorable reports which prove salvarsan to be a powerful remedy in inflammations of the iris and ciliary body. Our case 4 shows lack of success in vitreous opacities and organized posterior synechiæ. Case 5, shows the possibility of speedy relapse in the same eye and of the same form (patient was a prostitute and alcoholic).

Aside from the foregoing I observed the effect of arsenobenzol in one case of subretinal hæmorrhages, undoubtedly on a syphilitic basis. Patient was at the same time treated with

mercury, iodide and sweating, so that the result cannot be credited to arsenobenzol alone; yet, its curative effect cannot be denied in view of the rapid improvement. Patient was infected late in November. A large subretinal hæmorrhage and paralysis of the oculomotor were found in the right eye, and a round, sharply outlined subretinal hæmorrhage in the L. of half a disc size. V.R.E. 20/100; L.E. 20/20. Basilar meningitis. March the hæmorrhages were absorbed and all the other symptoms gone.

For general conclusions from all these observations we divide the cases according to the effect of salvarsan into the three groups. (1) Good results. (2) Doubtful results. (3) Cases with neutral action of salvarsan regarding the eye affection.

In the first group belong iritis, iridocyclitis, fresh oculomotor paralyses; further on cases of neuritis optica descendens, and atrophy, although these demand prolonged observation. It is an important fact that arsenobenzol has no bad influence on optic nerve atrophy. Since all other methods of treatment are useless and mercury is decidedly dangerous, I believe there is sufficient cause to try salvarsan in all cases of syphilitic degeneration of the optic nerve.

Second group. The influence of salvarsan on choked discs and certain ascending neuritis cases must be considered doubtful.

Third group. In cases of vitreous opacities, old miosis and mydriasis arsenobenzol is useless. I have never observed a bad influence on the condition of the previously diseased eye which could have been credited to salvarsan.

What, now, is our impression concerning the effect of arsenobenzol in the affections here detailed?

We must confess that the somewhat indefinite impression is due to the small number of observations and the possibility of improvement and details overlooked. One fact is without doubt that 606 is not an absolutely effective, radically curative, specific preparation, as has been insisted on by its passionate admirers.

It is, also, undoubted that it is in many cases equal to mercury in curative effect or even surpasses it since it enhances the rapidity with which the symptoms disappear. In other cases, like mercury, it is completely useless. The future will show wherein the solution lies of such an unequal action on the syphilis spirillæ, and which cases are favorable for arsenobenzol treatment.

Concerning point 7 enumerated in the beginning of this paper we may say the following:

(a) Relapses are not at all rare and sometimes come on quite rapidly, as in our cases 5, 9 and 10 of neuritis, and case 5 of iridocyclitis. This case proves that the disease may repeat itself in the same eye. All of this does not disagree with the statements in literature and the communications from other sources. Michaelis figures out 30 per cent. of relapses. Of the oculists relapses are mentioned by Kalt, Cohn, Axenfeld, Fischer, Flemming, Antonelli, Gallensowski, and they state injections of salvarsan do not necessarily protect against an eye affection of a hitherto sound eye; Davis describes an iritis after salvarsan injection which disappeared rapidly after a second injection. Some go further and state that eye affections are observed after the use of arsenobenzol, which are due to this remedy and its toxic properties. Stern maintains that arsenobenzol attacks with preference the muscular system; Finger observed an affection of the optic nerve; Richter (a pupil of Buschke) sees in arsenobenzol a nerve poison and observed anisocoria. Similar complications were seen by Kowalewsky, Rille, Wechselmann, and others. These accusations are successfully opposed by its supporters, at their head Tobias, by saying that the detailed cases are no absolute proofs and that the development of complications may as well be laid to the original disease as to the arsenobenzol. Lately Finger has again arisen against these defenders and described three cases of severe optic neuritis which he credited to arsenobenzol. All of these cases were of recently acquired syphilis; the syphilitic symptoms disappeared quickly after salvarsan, but in their place serious symptoms appeared in the optic nerves. Finger looks upon these as pure arsenical intoxications, not as nerve relapses. It is, of course, deplorable that the eyes had not been examined before the injection of 606, yet the identity of the three cases gives rise to the suspicion that Finger is correct. It may be that the arsenobenzol less than its method of application should be accused. The subcutaneous injections produce accumulations of arsenium in the body which in contact with dead tissues may produce poisonous chemical combinations which are continuously absorbed and act as toxins on the nerve tissue. In it they cause either an inflammatory or an atrophic process.

Based on my own observations I can rank myself with those who deny a deleterious effect of arsenobenzol on the eyes, at least, when it is used in the doses as in the cases here related. If this is an optimistic opinion, it is justified, first, by a, perhaps

accidental, happy selection of my cases; second, by the incomplete proof furnished by the rare clinical observations which are meant to affirm clearly and without doubt the unfavorable extra-properties of arsenobenzol; third, by the proven slight poisonous quality of arsenobenzol, which does not compare with that of the other organic arsenium preparations, like atoxyl, arsacetin and arsophenylglycin; fourth, by the experimental fact, that when arsenobenzol has been used no phenolarsenious acid is formed in the organism which may produce a kidney affection followed by disease of the visual apparatus.*

*The translator has not changed the somewhat promiscuous way in which the author uses the terms of 606, salvarsan and arsenobenzol, which, of course, refer to one and the same preparation.

BOOK REVIEWS.

THE OPHTHALMIC YEAR BOOK. By E. Jackson, M.D., Th. B. Schneidemann, M.D., and W. Zentmayer, M.D. Volume VIII. Herrick Book & Stationery Co., Denver, Col. 1911.

The Ophthalmic Year Book reporting the literature published in 1910, like its predecessors, should be and is a welcome addition to the library of every student of ophthalmology. Its completeness, the judicious selection and the perspicuous arrangement of the subjects are admirable. As a recent improvement we notice that the names of the authors are printed in heavy type and wish that the subheads were equally favored. The text is preceded by biographic notices of well known ophthalmologists whose life and work has come to an end. All ophthalmologists should show their appreciation of such an excellent and useful publication by buying it. Its price is nothing compared to its value to the student.

ANATOMIE AND HISTOLOGIE DES MENSCHLICHEN AUGAPFELS IM NORMALZUSTANDE, SEINE ENTWICKELUNG AND SEIN ALTERN (Anatomy and Histology of the human eyeball in its normal state, its development and senile degeneration). By Dr. Maximilian Salzmann. Five figures and nine plates. Leipzig & Wien. F. Deuticke, 1912. Price 19 kronen 20.

This truly excellent book on the anatomy and histology of the normal eye by a well-known worker, should be particularly welcomed by all those who are not in possession of one of the several large encyclopædias in which the same subject is treated. Much painstaking work is evident on every page and the description of the conditions found is ably and clearly set forth. The plates which are in the rather unhandy place at the end of the book, instead of being rather interspersed in the text where they could be more easily consulted, are excellent. They are with few exceptions drawn from the author's own specimens. The wish of the author not to burden the book with too much of the previous literature explains the fact that while many writers are mentioned, others will look in vain for a mention of their work. However, as a whole the book is excellent in every way and should be highly appreciated by the ophthalmic public.

EINFUEHRUNG IN DIE METHODEN DER DIOPTRIK DES AUGES DES MENSCHEN (Introduction to the methods of dioptrics of the eye of man). By Professor A. Gullstrand. With 20 figures in the text. Leipzig, Koenigstr. 2. S. Hirzel, 1911. Price 6 marks.

The author of this introduction to the methods of dioptrics of the human eye has recently been awarded the Nobel prize in medicine, a proof of how highly his work is appreciated generally and not alone by his confrères. The present monograph was written as a part of a handbook on physiological methods, yet it is written by an ophthalmologist and will therefore prove of particular value to ophthalmologists. It deals especially with the clinical methods of examining the dioptric apparatus of the eye and the mechanism of accommodation, and describes the older methods and some new ones. Thus this monograph is of great practical value in addition to the pleasure and satisfaction gained from its perusal.

GESICHTSFELD-SCHEMA FUER PERIPHERIE AND CENTRUM (Visual field record charts for periphery and centre). By Dr. G. Freytag. 50 charts. Leipzig. S. Hirzel. Price 2 marks.

Freytag's visual field charts have several new points which recommend them to the clinician. There are separate figures for the general field and for the central field, the latter four times the measure of the former; small heads for recording the degree of light and time of day when the field is taken, and for the general physical condition of the patient. The charts are gummed at the edge so they can readily be pasted on book or card.

ALT.

Vol. XXVIII., No. 12. DECEMBER, 1911. Whole No. 336

THE AMERICAN JOURNAL OF OPHTHALMOLOGY

EDITED AND PUBLISHED MONTHLY BY
ADOLF ALT, M. D.

ASSISTANT EDITOR,
J. F. SHOEMAKER, M.D.

CONTENTS.

ORIGINAL ARTICLES.

- Prevention of Ophthalmia Neonatorum. By M. H. Post, M.D., St. Louis, Mo. 353
Phantom Foreign Bodies Within the Eye. By ADOLF ALT, M.D., St. Louis, Mo.
[Illustrated]. 361

TRANSLATIONS.

- The Action of Salvarsan in Eye Diseases. By PROFESSOR W. DOLGANOFF, St. Peters-
burg. Translated by ADOLF ALT, M.D. 363

ABSTRACT.

- Intra-Uterine Ophthalmia Neonatorum 360

BOOK REVIEWS.

- The Ophthalmic Year Book. By E. JACKSON, M.D., Th. B. SCHNEIDEMANN, M.D.,
and W. Zentmayer, M.D. 379
Anatomic and Histologie des Menschlichen Augapfels im Normalzustande, seine Ent-
wicklung und sein Altern. By DR. MAXIMILIAN SALZMANN 379
Einfuehrung in die Methoden der Dioptrik des Auges des Menschen. By PROFESSOR
A. GULLSTRAND 380
Gesichtsfeld-Schema fuer Peripherie and Centrum. By DR. G. FREYTAG 380

SUBSCRIPTION, \$3.50 A YEAR IN ADVANCE.

316 METROPOLITAN BUILDING.

ST. LOUIS, MO.

Entered at the Postoffice at St. Louis, Mo., as Second-Class Matter.

60 YEARS'
EXPERIENCE

PATENTS

TRADE MARKS
DESIGNS
COPYRIGHTS & C.

Anyone sending a sketch and description may quickly ascertain our opinion free whether an invention is probably patentable. Communications strictly confidential. HANDBOOK on Patents sent free. Oldest agency for securing patents. Patents taken through Munn & Co. receive special notice, without charge, in the

Scientific American.

A handsomely illustrated weekly. Largest circulation of any scientific journal. Terms, \$3 a year; four months, \$1. Sold by all newsdealers.
MUNN & Co. 361 Broadway, New York
Branch Office, 625 F St., Washington, D. C.

ERKER BROS. OPTICAL CO.

...Practical Opticians...

608 Olive Street, St. Louis, Mo.

Sole Agents for Mueller's Patent Reform Eyes.

**Trial Cases and Trial Frames of all Descriptions.
Ophthalmometers, Ophthalmoscopes, Etc.**

We have the Best Equipped Plant for grinding special lenses.

Send us your Prescriptions.

✧ ✧ ✧

We guarantee accurate work, prompt returns and low prices.

COLLABORATORS:

Ayres, Dr. S. C., Cincinnati, Ohio.
Beard, Dr. C. H., Chicago, Ill.
Green, Dr. John, St. Louis, Mo.
Howe, Dr. L., Buffalo, N. Y.
Pooley, Dr. T., New York.
Risley, Dr. S. D., Philadelphia, Pa.
Thepbald, Dr. S., Baltimore, Md.
Thomson, Dr. W., Philadelphia, Pa.
Webster, Dr. D., New York, N. Y.

Allport, Dr. F., Chicago, Ill.
Bruns, Dr. H. Dickson, New Orleans, La.
Hansell, Dr. H. F., Philadelphia, Pa.
Millikin, Dr. B. L., Cleveland, Ohio.
Prout, Dr. J. S., Brooklyn, N. Y.
Ray, Dr. J. M., Louisville, Ky.
Ryerson, Dr. G. S., Toronto, Canada.
Strawbridge, Dr. G., Philadelphia, Pa.
Thorington, Dr. J., Philadelphia, Pa.
Wadsworth, Dr. O. F., Boston, Mass.